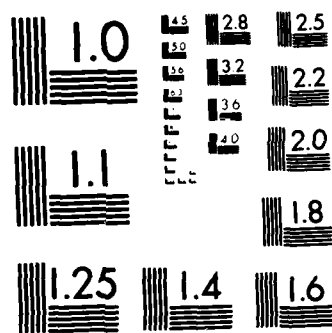


AD-A144 088 FIELD-WORK REPORT MEDWAY ESTUARY 28 JUNE - 18 JULY 1983 1/1
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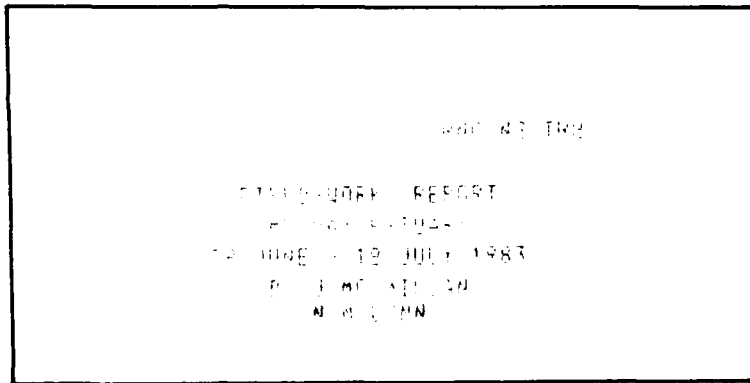
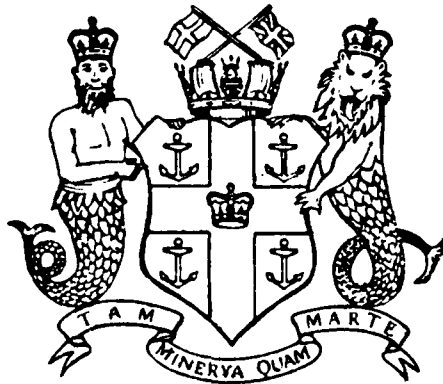
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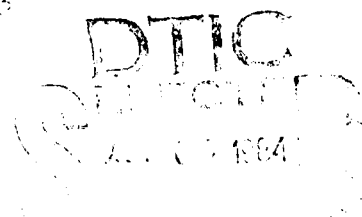
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FIELD-WORK REPORTMEDWAY ESTUARY 28 JUNE - 18 JULY, 1983D J McMILLAN
N M LYNN

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December 1983

Participants: 28th June: Mr Lynn, Mr McMillan.
 1st July: Mr Lynn, Mr McMillan.
 4th July: Miss Carter, Mr Lynn, Mr McMillan, Miss Marsh.
 11th July: } day: Miss Carter, Mr Lynn.
 } day: Mr Morton, FC MEA Whiting.
 Full day: Mr McMillan, Miss Marsh.
 12th July: Mr Baker (Southern Water Authority), Mr McMillan,
 Miss Marsh.
 18th July: Mr Lynn, Miss Marsh.

Unless otherwise stated all personnel were staff of the Royal Naval College.

Introduction

Field-work was undertaken in the Medway Estuary (Figure 1) between 28th June and 18th July 1983 as part of the Estuarine Research Project (ERP) within the Department of Nuclear Science and Technology at the Royal Naval College, Greenwich.

The time-table for the work is given in Table 1: two tide gauges were deployed on the 28th June at Sheerness for testing against the standard tide gauge installed there. The two tide gauges were taken out and re-deployed elsewhere in the Medway Estuary on the 1st July, and were finally recovered on the 18th July. Three days of monitoring were also undertaken (4th, 11th, 12th July): a high-speed axial profile (4th July), monitoring of dye and fixed-point monitoring of water parameters (4th and 11th July), monitoring of wind (11th July), a further high-speed profile (12th July).

The field-work was undertaken to test equipment and procedures in the field, to test the capabilities of a loaned inflatable craft, to obtain information to improve the project's computer modelling technique, and to gain information for validation of a 1-d transient estuary model.

General Information

The RNSEA yacht Grenavic and an RNSEA inflatable were used for the field-work. Field-work commenced at 05.00 on the 4th July and 11th July and ended at approximately 23.00 on both days; on the 12th work commenced at about 11.50 and ended at approximately 16.30. Scientific work started at 07.48 on the 4th, 06.43 on the 11th, and 12.00 on the 12th July.

All times given are in BST. The times of High Water (HW) and Low Water (LW) and their respective heights in metres at the East Wharf, Chatham Locks, were:

	LOW WATER	HIGH WATER
4th July	01.20 (1.12m) & 13.25 (1.37m)	07.40 (4.26m) & 19.50 (5.02m)
11th July	08.30 (0.55m) & 20.55 (0.38m)	02.00 (5.0m) & 14.20 (5.02m)
12th July	09.10 (0.5m) & 21.50 (0.28m)	02.40 (5.13m) & 15.10 (5.02m)

The dates were chosen to correspond with Neap Tides on the 5th and Spring tides on the 11th and 12th July.

Tide Gauge Deployment 28th June - 18th July

Two bottom-mounted, pressure measuring, internally recording, tide gauges were deployed on the 18th June with the assistance of Medway Ports Authority (MPA) at the position shown in Figure 2 close to the standard tide gauge at Sheerness. One of the tide gauges an MBA (Controls) Ltd DNT-2B records measured pressure onto an internal chart recorder, and the other an MBA (Controls) Ltd DNM-5 records conductivity, temperature, and pressure variation onto a cassette tape.

The gauges were recovered on the 1st July and re-deployed at Cuxton Marina and at Needs Paper Mill (Figure 2) after replacing the cassette in the DNM-5 and winding on the chart-paper in the DNT-2B. The gauges were finally recovered successfully from these positions on the 18th July.

It was found that the DNM-5 had been raised and dropped onto its side by a yachtsman during its deployment at Cuxton Marina, and that its batteries had not lasted the deployment. Some difficulty was encountered when recovering the DNM-5 because of the depth of water, and because during the accident the gauge had been turned on its side.

The data from the tide gauges requires corrections for atmospheric pressure. Barometric pressure readings were obtained from Medway Ports Authority at Sheerness.

Axial Profile 1 (4th July)

An axial profile was attempted at high-water using a small inflatable. A Partech salinity, temperature, depth sensor (TDS) and suspended solids monitor (7000 SRP) calibrated for 0-100 and 0-300 mg/l (turbidity standard) were to be lowered to total depth at certain positions (Figure 3) and readings taken at various depths on the way down. The values obtained were to be checked whilst raising the instruments, and water bottle samples were to be taken.

The craft left the moored vessel at 07.20 and arrived at Position B at 07.50. The depth sensor was not working at this station and the depth to the sensors, and total depth were obtained using the small echo sounder on-board the inflatable. At 08.14 at position D the conductivity and temperature sensors failed. For stations after station D water samples were collected for laboratory analysis to determine salinity, water surface temperature was determined using a thermometer, and turbidity profiles were run using the echo-sounder to determine the depth to the sensor.

The last station was occupied at 10.42 although the inflatable was by now suffering from engine trouble. The inflatable then proceeded back to the moored vessel.

Axial Profile 2 (12th July)

An axial profile of the estuary was completed by occupying the positions shown in Figure 4. The profile was completed using a fast vessel from Southern Water Authority to ensure that the positions were occupied at approximately the same state of the tide. Salinity temperature readings were made using a Partech salinity - temperature sensor (TCS). Twenty-six stations were occupied as position 10 was omitted, it took up to 2 minutes to complete a vertical profile as results obtained when lowering the sensor were checked when it was raised.

Fixed Point Monitoring 4th and 11th July

Fixed point monitoring of current speed and direction, turbidity, salinity and temperature was undertaken from a moored vessel (Figure 5). At given times a

vertical profile was taken to determine the vertical variation in water parameters. A profile consisted of raising the sensors to just below the surface, taking a 60 second average of current speed and noting current direction, salinity, temperature, turbidity and depth, and then lowering the sensors until the next monitoring depth when the monitoring procedure was repeated; monitoring at subsequent greater depths was undertaken until the bottom was reached. Salinity, temperature and turbidity readings were checked whilst raising the sensors, and any variations noted to ensure that a true profile was obtained. The sensors were then lowered to 2m below the surface until the time for the next vertical profile. Water samples were taken at regular intervals for laboratory analysis.

The sensors used were: a current meter, DNC-3 from NBA (Controls) Ltd with water-run and water temperature parameters; a turbidity meter calibrated using turbidity standards 0-100 mg/l and 0-300 mg/l, 7000-3RP with S100 head from Partech Electronics Ltd; and a salinity and temperature sensor, TDS 81 from Partech Electronics Ltd.

4th July

Monitoring commenced at 08.44 and continued every half hour until 12.00, when it was decided to reduce the frequency of the vertical profiles to one an hour. Water bottle samples and surface water temperatures were taken at regular intervals for laboratory analysis.

A further current meter (DNC-3) was deployed for testing purposes; temperature and salinity readings from this DNC-3 were compared with those obtained from the TCS used. The temperature readings from the TCS were also compared with those obtained from the other current meter. Both current meters were tested running from batteries and from 240V ac supplied by a small generator; this was the first occasion that the 1900W Honda generator had been tested under field conditions.

During the afternoon three chart recorders were tested under field conditions to evaluate their use in fixed-point monitoring data collection - a 5-pen Mikadenki, a 2-pen XYY/t plotter (PL 2500) and a 1-pen XY/t recorder (PL 4). Monitoring finished at 19.55.

11th July

The first vertical profile was started at 08.01. The current meter and other sensors had been prepared for deployment the previous night so that monitoring could commence at low water. The equipment was run from internal batteries for the duration of the field-work and no chart recorders were used.

At 14.00, the depth sensor on the current meter failed. On return of the boat containing the fluorometer, monitoring was continued at 15 minute intervals at a depth of 0.5m. At 21.19 monitoring was stopped.

Dye Monitoring 4th and 11th July

As an aid to understanding the dynamics and dispersion characteristics of the estuary dye dispersion experiments were undertaken on both days. The fluorometer used was a Turner Mk II fluorometer which had been previously calibrated in the laboratory.

20l of a dye/methanol mixture was injected at 07.48 at the position shown in Figure 1. Unfortunately, due to the length of time taken to complete the axial profile mentioned previously the inflatable was not able to examine dye variations until just before low water. At this late stage it proved impossible to follow

the dye and only an idea of the dye concentrations could be obtained.

Just before high water a further series of runs was undertaken including a traverse into an area upriver of the dye to check background readings. At this stage the fluorometric readings had reduced to approximately twice the level of background.

11th July

The monitoring was undertaken in the first instance by Mr Lynn and Mr McMillan; all comments were taped and positions also noted on waterproof overlays. Positions on traverse lines were determined using bearing to prominent marks. Prior to commencement of the day's work a blank fluorometer reading was taken using the pump system in the inflatable. The tubing inlet was set at 0.2m below the water surface. At regular intervals the fluorometer's internal temperature and water temperature were tested.

At approximately 08.45 20l of the dye-methanol mixture was injected at the position shown in Figure 5. The lateral traverse lines (Figure 6) were then occupied in turn after the main body of the dye had passed the previous traverse line. Line A was occupied first, then when it was apparent that the dye would take some time to arrive, a traverse was undertaken to the Engineers Pier before reverting to traverse A.

The tubing to the pump was shortened at 09.52 to decrease the time taken for the water to reach the fluorometer from the end of the tubing. At 12.32 the fluorometer tubing was set to 0.5m below the water surface. At 12.35.30 the inflatable returned to Grenavic to permit the transfer of Mr Lynn for Mr Whiting.

Traverses restarted with Mr Whiting and Mr McMillan at the remaining traverse positions. The readings indicated that either the dye was homogeneously mixed across the estuary at these traverse lines at about background level, or the dye had been lost.

The fluorometer chart recorder trace showed that the 12V dc battery was low at 14.49, and the traverses were consequently stopped to return to collect a new battery. At 15.00 the oil warning light on the motor of the inflatable came on and an emergency stop was therefore made at Rochester Cruising Club. The engine was briefly examined and it was found that the oil reservoir had plenty of oil. It was decided to continue the trip back to the moored vessel slowly, and to abandon any other traverses.

A ship's battery was then used to power the pump from an inflatable alongside the moored vessel. At about low water the battery was unable to power the fluorometer, chart recorder and pump together. The fluorometer experiment was therefore concluded at 21.00.

Wind Station (11th July)

To reduce the number of unknown environmental parameters affecting the water parameters being monitored a wind gauge was set up on Thunderbolt Pier (Figure 5). The equipment used was a portable anemograph type R500 manufactured by Vector Instruments and comprised an anemometer and a windvane. The equipment was run off internal batteries and once set up was allowed to run for the complete day.

The equipment was in place and turned on at 06.43 and removed at 20.00.

Acknowledgements

The Estuarine Research Project team would like to thank the Site Manager at Reeds Paper Mill and the Manager at Cuxton Marina for permitting a temporary tide gauge to be put down, personnel of the Southern Water Authority (Kent Division) in particular Mr Baker for help and cooperation with the field-work, and personnel of the Hydrographic Section of Medway Ports Authority in particular Mr Thorne and Mr Stoyles for their help and cooperation throughout the field-work.

Miss Marsh drew the figures.

D J McMILLAN & N M LYNN

	28th June	1st July	14th July	11th July	12th July	18th July
Tide Gauge DWT-23	SHEARNES		REEDS PAPER MILL			
Deployment DWT-5	SHEARNES		CUXTON MARINA			
Axial Traverses						
Fixed Point Monitoring						
Dye experiment						
Wind gauge						

Table 1 - Field-work Time-table.

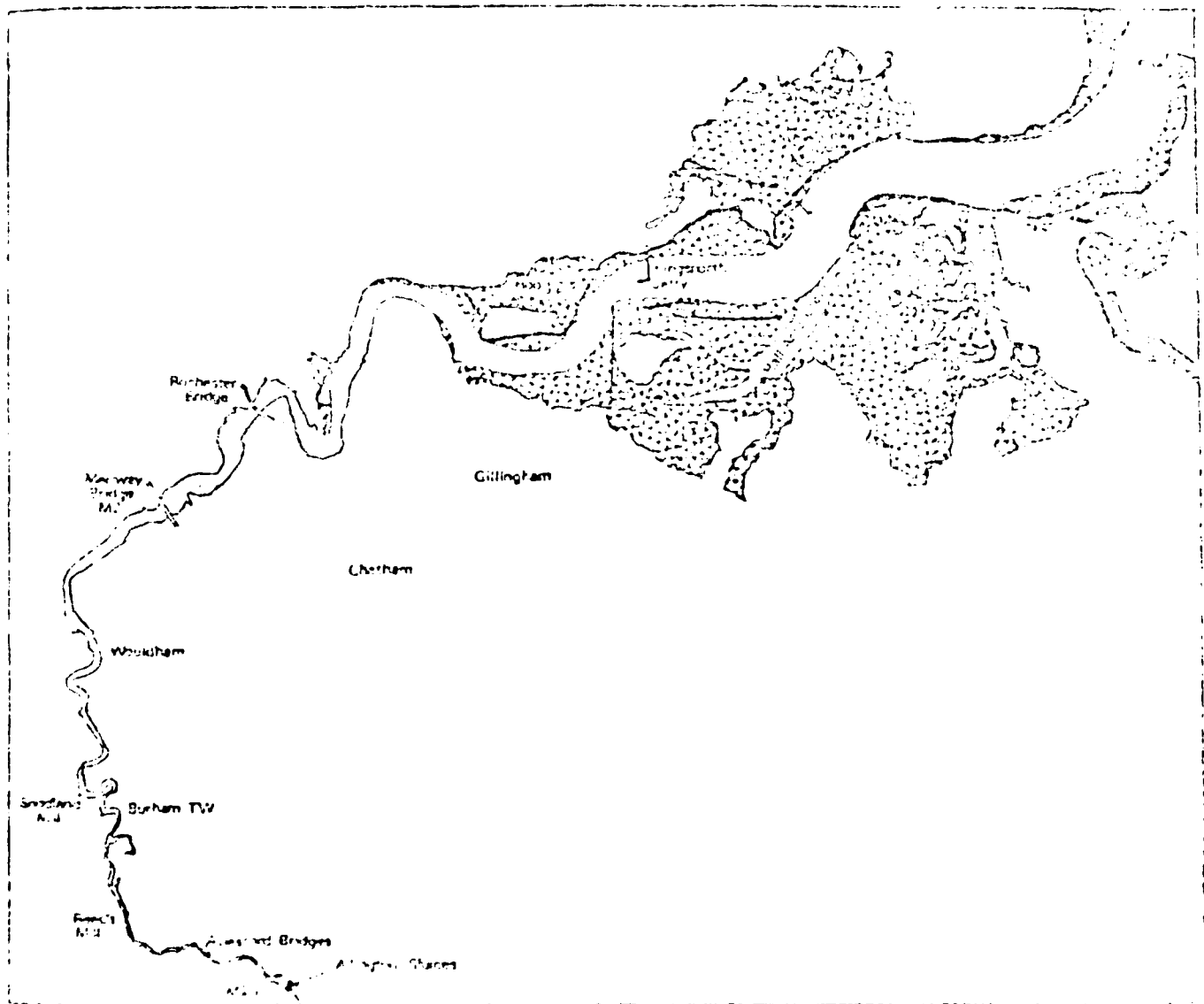


Fig. 1 - The Medway Estuary

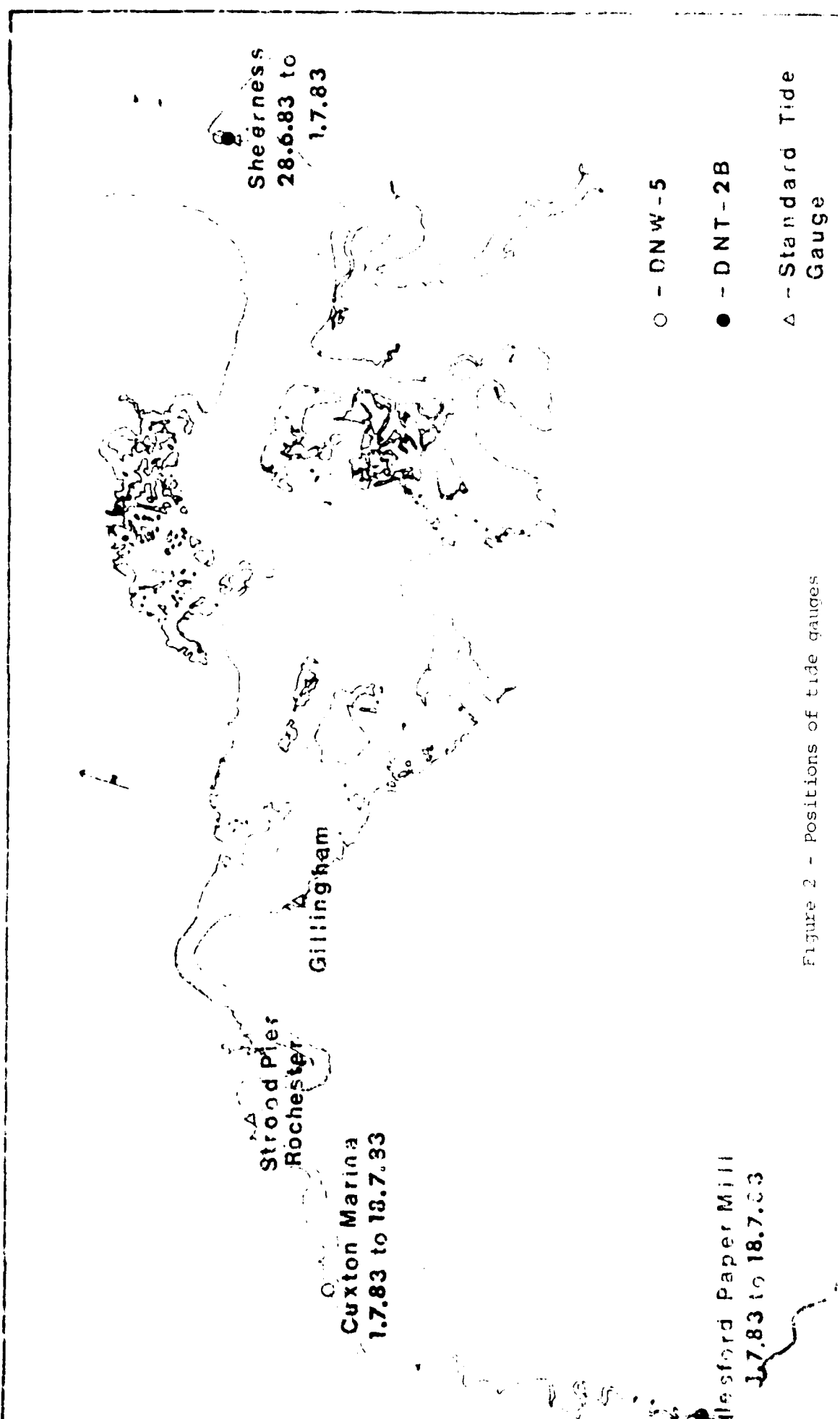


Figure 2 - Positions of tide gauges

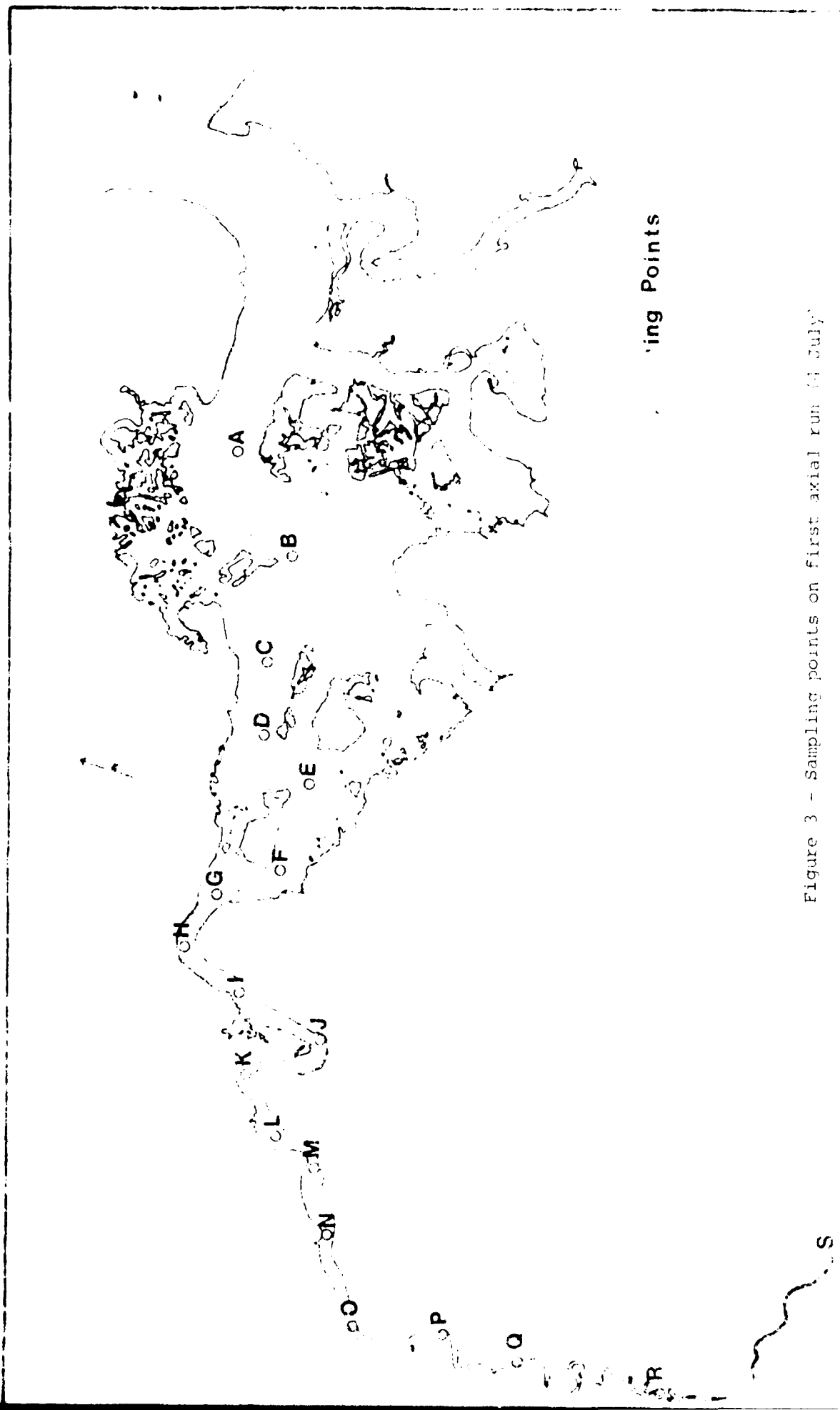


Figure 3 - Sampling points on first axial run (4 July)

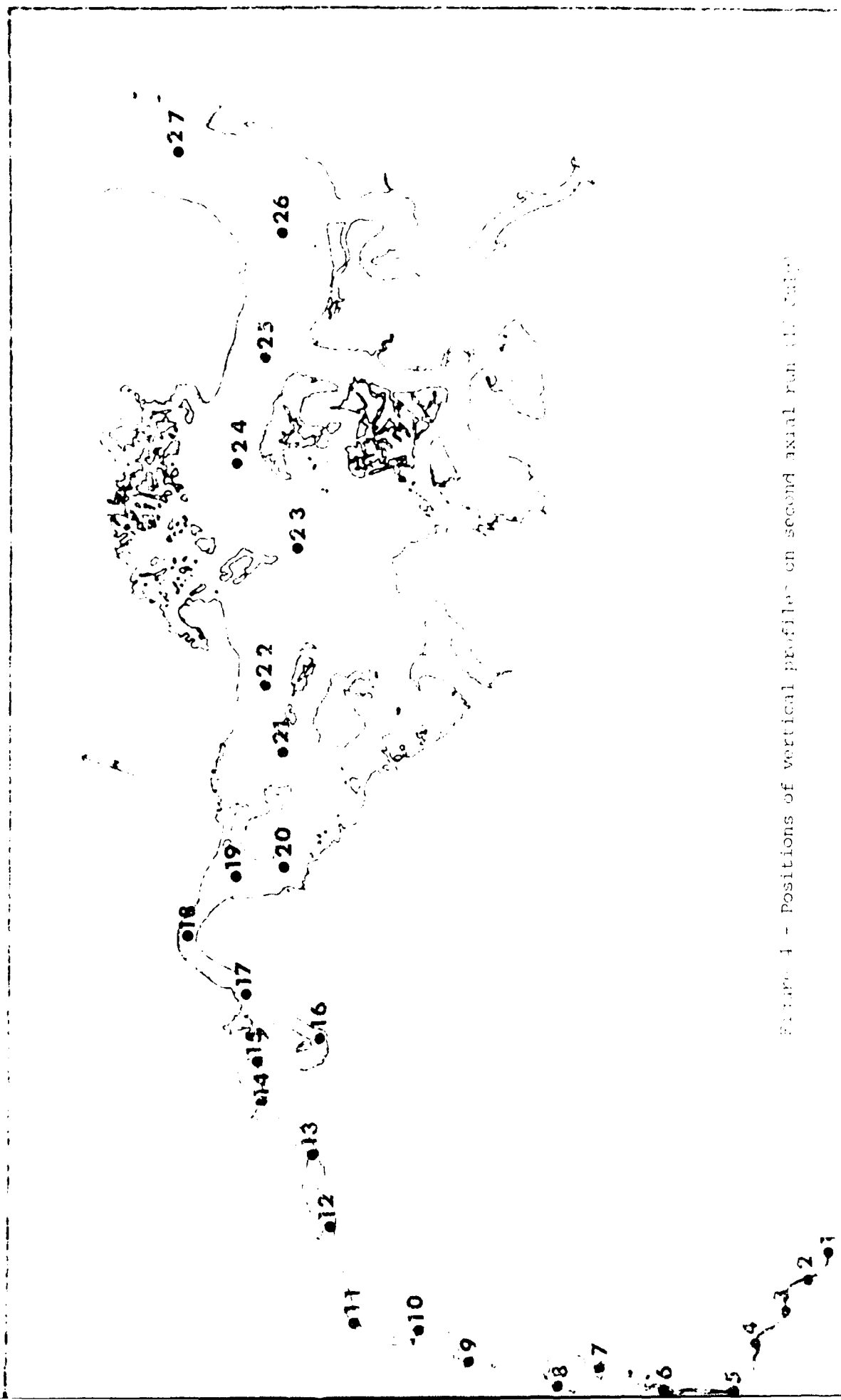


Figure 4 - Positions of vertical profiles on second axial run (11 cases)



□ Dye Dump 4.7.83

● Fixed Point
Monitoring Station

■ Dye Dump 11.7.83

▲ Weather Station
06:43 to 22:00

Figure 3 - Positions of Dye dumps,
fixed point monitoring
station and weather station

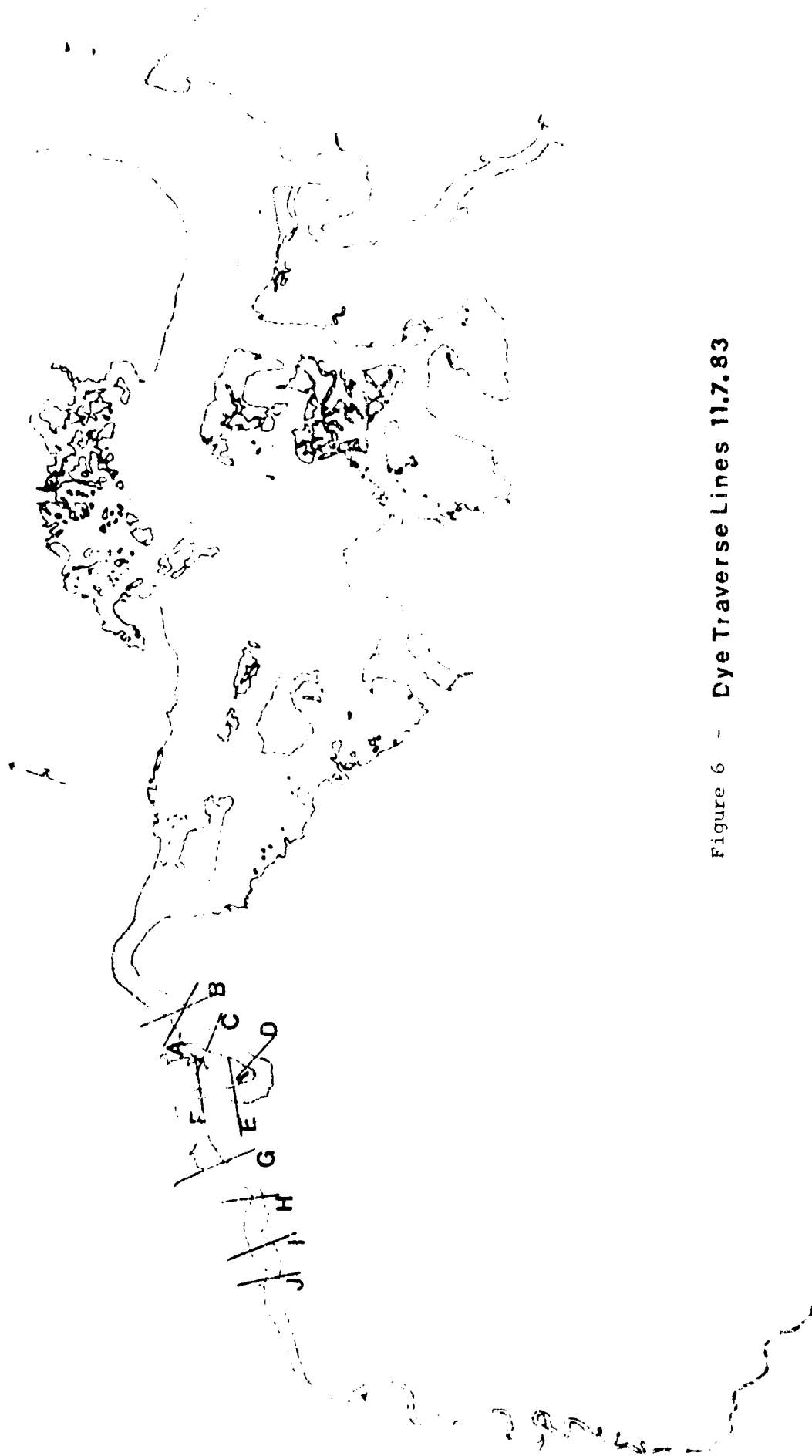


Figure 6 - Dye Traverse Lines 11.7.83

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